INFLUENCE OF ENVIRONMENT ON SURGERY*

BY

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I always make a point of inquiring of postgraduate students from abroad about the conditions under which they work in their own countries, and one soon realizes that those conditions are often very different from our own, sometimes fundamentally so. Sometimes it is a matter of different diseases, such as yaws or bilharziasis, with a background of anaemia and hypoproteinaemia; or a different incidence of familial diseases, as, for example, the high incidence of gall-bladder disease in Scandinavia, or the relative rarity of varicose ulcer in Persia; sometimes it is a matter of national wealth or the state of social advancement of the particular country, there being, in some, extreme wealth and extreme poverty side by side, whilst in others the whole organization is backward; or, yet again, it may be the effect of geography on communications. At any rate, it soon becomes obvious that such environmental circumstances may modify, even dictate, what a surgeon can do or should do with regard to the management of the different types of surgical disease he encounters. This was somewhat vividly impressed on my own mind when, a few years ago, one of my best registrars, thinking he would like to practise surgery in the Colonial Service, went for interview, and found that they wanted him to go into the hygiene side of the Service, since "he would save more lives thereby," which in those backward areas is, of course, true; and, again, when a man working in Rhodesia reported in a letter that he was treating children with tuberculous meningitis as out-patients because there were no beds.

I think that it is a good thing, from time to time, to give a little thought to this question of environment, and that our students, housemen, and registrars should be made to realize that the environment in which they choose to work, or may be called upon to work, may be so different from the one in which they received their medical education that their attitude to their work and their management of cases may need to be completely different. Let us consider a few examples.

War Surgery

Wars have always been a stimulus to surgical progress, and many of the great surgeons of the past received their first inspiration on the field of battle. In our own time we have witnessed two world wars, as well as smaller ones in Korea and Malaya. War brings us right up against fundamentals, and the environment of war has many facets, such as terrain, climate, communications, and type of warfare, which combine in different ways to produce changing circumstances, often demanding a change in management of wounds. Let me enlarge further.

The *History of the Great War (Medical Services)* recounts how from appalling sepsis, spreading cellulitis, and septicaemia during 1914 and 1915 the surgeons learnt that bold excision of wounds, particularly of dead and devascularized muscle, together with removal of in-driven pieces of clothing or equipment, was the best way of saving life and limb; that these wounds should neither be packed nor stitched; that efficient splinting should be used; that there was an important time factor showing that war wounds were contaminated up to between six and eight hours and then, after

that, became truly infected; they even discovered the value of the principle of delayed suture.

All these fundamental factors were learnt before there were any sulphonamides, antibiotics, readily available blood or blood substitutes, or any knowledge of fluid and electrolyte balance. After the war was over, all this was written up in great detail, yet I suspect that the truly rock-bottom fundamental reasons for the behaviour of these wounds was not fully appreciated. At any rate, it would appear that these lessons were not passed on, and by the time the second world war started the official history was out of print and there was literally nothing to guide young surgeons entering the Services in 1939. These young men naturally argued that their own particular hospitals employed the latest advances in everything, and that what they had been taught in the casualty department and on the accident services, especially since sulphonamides had been discovered and blood banks could be organized, was in advance of what was available during the previous major war.

Textbooks of surgery and bedside teaching, however, did not speak of the circumstances under which war wounds were sustained, but when those circumstances were suddenly reintroduced there was no readily available literature for reference. All had been forgotten and everything had to be relearned or, rather, the reasons behind the varying behaviour of wounds under the changing circumstances of war had to be rediscovered. Books describing the surgery of the Spanish Civil War had recently been published, and were seized on as a fair description of the latest advances in war surgery; yet when applied to wounds in the environment of France, the desert, or North Africa these methods proved unsatisfactory, not to say dangerous. The explanation was that most of the Spanish Civil War casualties were picked up off the streets of Barcelona and other towns and were in hospital within half an hour or so, often less. Under such conditions of continuous medical supervision it was safe to apply closed plasters, but in a major war, where there were long delays in collecting casualties, gross contamination of wounds, enforced evacuation following the first surgical treatment, often for long distances, such methods were absolutely wrong.

As a result of different environment an interesting and major difference of opinion developed between Eighth Army surgeons with their experience in the desert and those of the First Army in North Africa, because basic factors had not been accurately analysed. The Eighth Army surgeons had been delighted with the behaviour of wounds in the desert, and attributed this to the sulphonamides combined with Eighth Army judgment. They began to feel that the excisions of the first world war were unnecessary and, indeed, mutilating; and a directive was issued stating these principles. Many hundreds of miles further west the new First Army was meeting with a very different experience in a very different environment, and their surgeons found that the behaviour of wounds in the wet, cold weather, on the highly cultivated soil of North Africa, demanded bold excision as learnt and practised in the first world war.

The two armies met in Sicily, and the surgical consultant, an Eighth Army surgeon, laid down the principles evolved in the desert, feeling sure that with sulphonamides, together with the earliest supplies of the new wonder drug penicillin, all would be well. Environment, however, won again; no longer were men fighting in shorts and open shirts or even stripped to the waist as in the desert; no longer was the terrain dry sand, but the mud of a highly cultivated soil, and there was a great shortage of beds and long delays in treating wounds. The old spreading cellulitis, osteomyelitis, septicaemia, reappeared, and I well remember A. L. d'Abreu

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writing to me from Sicily, describing it all and saying, "I am a confirmed exciser," and later, in Italy, so were we all.

It is quite certain that, in war, environment dictates what is the best management of wounds, yet in order to apply the optimum treatment it has to be appreciated that this environment is not constant, but is ever changing, according to the many different factors already mentioned, and that, with an appreciation of these (one of the most important functions of the consultant), the behaviour of wounds can be foretold and the best management planned.

The important thing to grasp is that any really major catastrophe, such as an earthquake, a collapsed building, or a serious train smash, may introduce just those same factors of contamination, delayed treatment, long exposure, dehydration, and blocked communications, and thereby demand the same sorts of modification of management.

Before leaving the subject of battle casualties and their management according to the circumstances of the moment, I must recall how, in spite of these two major experiences in 25 years, once again there was evidence that some of the lessons had been forgotten as early as the Korean War. I saw some of the early casualties in the American Naval Hospital in Boston, and was disappointed to find that none of the wounds had been treated by delayed primary suture.

Return to Peace

After 1945 one saw peace-time surgery built up. I suppose that teaching hospitals have never been so fortunately placed with respect to equipment, laboratories, and technical assistants as they are to-day, and surgery has positively leapt forward in the past decade, and the pace quickens even now. Unfortunately, the development of new specialties tends to fragment surgery, and the danger is that such specialties may have to be housed in outlying hospitals for lack of room in the main ones. This is not good, for it results in isolation, and this, in turn, during the second and third generations of such specialties, may lead to stagnation. Besides, really alert and progressive specialties are by no means constant or definitive in their boundaries, which inevitably overlap, and it is essential that they be with others. It seems to me that the one solution to this important problem is to have under the common roof of the teaching hospital token units, of say 10-20 beds each, of all specialties, where they will keep in touch with general medicine and surgery, as well as rubbing shoulders with each other. All of them, general medicine and surgery as well as these new specialties, should be exploring the growing edge of their own subject, and a common place of work is a general stimulus.

The main medium of exchange of ideas is the conference habit and the seminar, in which the North American centres are so pre-eminent. Such an arrangement is mutually beneficial, and such an organization establishes a haven for the whole. I think that such things as the endocrine approach to the late stage of breast and prostatic cancer, the newer vascular surgery wedded to that of the past 25 years, the ding-dong match between medicine and surgery in the treatment of hypertension, the newer heart surgery, all stem from such organization and the meeting of keen young minds. Such advances would probably have occurred even though units were in isolation; but they might easily go awry, and there would not be that whole body of knowledge freely available to all, nor those frequent discussions that are so valuable and fruitful.

Even more important is the influence that such an environment of progress, free criticism, exchange of knowledge and experience, and of striving after something better has on housemen and surgical trainees; and certainly not less important is the effect on the medical student, who senses this spirit of inquiry and self-criticism, and learns not to accept without questioning all that is taught, and realizes that there is far more to discover than is already known.

Research Laboratories

Whole-time university clinical departments were not always generally popular, yet I think they may claim to have

achieved something; for, in spite of the slight doubt that may still linger in the minds of some, they have received kindness and co-operation from their part-time colleagues. I think their most useful recent contribution is the building up of laboratories near to the wards, wherein young trainees can worry out problems suggested to them by some bedside or operating-theatre experience. Of course, this means that their ward duties must be so arranged that they can spend two or three half-days each week in the laboratories. One well-known surgeon once told me that he foresaw that all such laboratories would eventually fall into the hands of tame physiologists, but there is no fear of this provided one takes note of the many problems suggested by bedside and theatre experience. The reason why these laboratories are so essential is that problems that never come into the experience of preclinical departments can be investigated. Surgery is an applied science and probably the highest form of it, and there are plenty of practical problems for investigation.

Here, then, is another most potent factor in the general environment or atmosphere of the modern teaching hospital, and I am delighted to find senior registrars of *non*-professorial firms now asking for laboratory space in order that they may work on some problem of their own choosing. Of course, one must have technicians to help, and, as the work increases, maybe science graduates for biochemistry and electronics too. As in the major schools in the United States, it should be possible for a man of senior registrar grade to break off for a year of research, without losing salary, status, or seniority, even though for that year he may be called a "research fellow." Modern experience of selection committees discloses the most interesting fact that the trump cards for an applicant to hold are several teaching hospital posts, a year or two in good regional hospitals, a year or more on a professorial unit, and a year on research, either in his own school or in a major centre at home or abroad.

This description of what I conceive to be the best general pattern for a well-balanced and progressive teaching hospital would not be complete if I did not pay tribute to the contribution the bright intelligent student, especially the B.Sc. student, makes to the general atmosphere of enthusiasm. He brings the latest information from the pre-clinical sciences, and adds greatly to its application to practical surgery.

Of course, we must guard against teaching hospitals becoming too highly specialized in patent surgery, dependent on more and more elaborate machines that require more and more technicians to work them. Such would indeed be a bad environment in which to teach undergraduates and train young surgeons. Indeed, it would savour somewhat of the tendency in university life to-day to worship at the altar of research at the expense of teaching: let not the latter become a shrine instead of one of its prime functions. We all recognize that clinical teaching to-day needs to be based more and more on fundamental knowledge and principles than on masses of facts, giving the student a background of knowledge from which he can argue out for himself solutions to problems as he meets them in patients: in other words, a more positive application of physiology, pharmacology, and pathology to ward work. In the past we have been too inclined to teach the facts of our own particular subject, leaving the students to discover whether these facts have any relationship to what they have already learnt in the pre- and para-clinical subjects. Rather should we ourselves adopt this more basic knowledge and point the way to its application to the solution of the patient's illness.

Teaching of Anaesthetics

One final remark regarding medical schools concerns the teaching of anaesthetics. A large proportion of surgical procedures to-day demand a type of anaesthetic that must make it difficult to find opportunity to instruct the student on the kind of anaesthetic that he may be called upon to administer should he practise in small towns or country places. For some years now, we in Birmingham have arranged for final-year students, on a voluntary basis, to

spend two weeks working with doctors in general practice. The scheme has been highly successful, and has resulted in some useful criticism from both sides. Recently, a doctor spoke highly of the student attached to him, but said that he seemed quite ignorant of how to set about giving a simple anaesthetic for the stitching of a laceration or the opening of an abscess in the local cottage hospital. Personally, I believe that the time has come when the teaching of practical anaesthetics should be given during the pre-registration year. The teaching hospital may not necessarily be the best place for this, since much of modern surgery demands complicated machines and polypharmacy that the general practitioner would never be called upon to use. A busy casualty department, on the other hand, does offer an opportunity for learning about the simpler anaesthetics, and our senior anaesthetist makes use of this environment for teaching: but not all students can pass through his hands.

Environment of the Theatre

The periodic appearance of sepsis in wounds and the rising incidence of the penicillin-resistant staphylococcus make all hospitals anxious. Heneage Ogilvie has even suggested that the discovery of antibiotics will in the long run prove a curse, but I do not suppose there are many who would wish to return to pre-penicillin days. What is needed is a more intelligent use of the many antibiotics that are now available, and it certainly behoves us to put our house in order so far as aseptic discipline is concerned. The difficulty is that 99 times out of 100 one can flout the rules yet meet disaster on the 100th. It is then difficult to be sure what is the specific weakness in our technique. Blower *et al.* (1955) and Cook *et al.* (1957) both point to blankets as a strong factor in harbouring the staphylococcus as well as other organisms which will infect the noses of the staff and, in turn, the wounds of patients; and those from St. Bartholomew's Hospital (Shooter *et al.*, 1957) confirm Seddon's work on theatre ventilation just after the war. At the same time, the M.R.C. report on cross-infection in 1943 deserves restudy.

In large hospitals the modern tendency to increase the tempo of work in order to keep pace with the waiting-lists and to avoid waste of time in view of the financial cost per patient per day most certainly increases the risk of cross-infection, which is the reason why sepsis is less common in the smaller hospitals. But I believe that some of the worst offenders against theatre discipline are the surgeons themselves; and any disregard for fundamental principles is inevitably passed on to registrars, housemen, and students.

Permeable masks, uncovered noses, outdoor shoes and trousers for momentary onlookers, popping in when fully dressed to have a last word with the registrar before going, are all cardinal sins. The dresser scrubbing up for the case should change completely just as the rest of the team; but extravagance of linen is the usual excuse for not insisting on this. A very great danger is the physician who wants a word with his surgical colleague. In full lounge suit he leans round the door, talking into his handkerchief and polluting the atmosphere. A small loud-speaker from the annexe or off-duty room should permit these conversations without the potential danger.

Ventilation should certainly be checked. Many hospitals are thought to have positive pressure in the theatres when in fact they have not.

This is all a very difficult story, with many more facets to it than I have time to mention, but the red light has flickered, and the all-important thing for the safety of the patient is to stick to a rigid theatre discipline, the chiefs being the most earnest exponents of it: it is a matter of medical morals.

Demands of Newer Surgery

So far I have dwelt on the two extremes of environment as it concerns the surgeon—the battlefield and the near-ideal teaching hospital of 1957: there lies a vast territory in between. It may be just a matter of new activities in old buildings, where keen young men have to work with limited facilities. For instance, a surgical friend of mine who has

done much work on peripheral arterial disease had performed an excision of an abdominal aortic aneurysm and replacement by a graft. The operation went well, but several days later it was obvious that a leak had developed and that a second and emergency operation was necessary. The difficulty was to find a theatre, of which there were only three, for it was in the morning and all were busy with routine lists. After some effort he managed to persuade one of the other surgeons to cut short his list so that the emergency could be dealt with. Now, there we find something really fundamental: first, that many modern operations can be undertaken safely in modern hospitals, where, in case of a complication, a theatre and its full team can quickly be made available; and secondly, and as a corollary, a major procedure of uncertain duration but potentially protracted is more safely managed if it is the only operation on that particular list.

If we now pass from major hospitals on to hospitals without really senior assistants, without generous laboratory services such as in some country town institutions, or where special nursing would be difficult to obtain, it can be seen that certain of the more intricate and protracted types of operation, especially those pregnant with potential complications, cannot be undertaken with safety and should not be attempted. The older members of the staff would know this, but a young and newly appointed man, fresh from the hot-house of high-powered surgery, might well be tempted to "have a go," yet the slightest hitch would spell disaster.

Surgery in Backward Countries

Going further afield, I well remember how, at a selection committee for a post in one of the outposts of the Commonwealth, a candidate said that one of his chief interests was the surgery of portal hypertension, yet I knew from personal experience of a similar environment during the war that the nursing there consisted of a few English sisters in charge of illiterate natives, who could not possibly keep fluid charts or take blood pressures; that many of the anaesthetics were given by the native pharmacist; and that the resident staff was small and not very experienced. Blood in large quantities would be impossible to obtain, and repeated electrolyte estimations difficult to arrange.

Difficulties of language can make history-taking tedious and inaccurate. For two years of the war I was in Sierra Leone, where there are many tribes and many languages. On one occasion a soldier from one of the smaller tribes, using one of the rarer languages, could be communicated with only through five different interpreters, using five different languages. It can well be imagined that under such circumstances only very straightforward diagnoses were possible, especially when translation into English produced such expressions as "belly palaver" or "my head he hurt me." These natives live in primitive conditions, often several hundred miles from the hospital, so that there is no possibility of aftercare or follow-up, and in such an environment there is no place for exotic surgery; indeed, it would be a disservice.

A colostomy would be quite insupportable for those living in mud huts with palm-leaf roofs, sleeping on the mud floor of the only room with the rest of the family. Amputations are tragedies in a country where there are no artificial limbs and where custom demands that you either earn your food or take the consequences. Prolongation of life in victims of advanced cancer by x-ray therapy, or attacks on the endocrine glands where there is no chance of follow-up or out-patient supervision, is not kind, helpful, or practical, and therefore not ethical.

Nevertheless, a surgeon's life in these parts is fascinating and full of interest, for he must be something of a jack-of-all-trades. In preparation for such a life it is obvious that he must have served on a fracture and orthopaedic unit, on a genito-urinary unit, and have gained some experience in ophthalmology and ear and throat work. He will find a host of new diseases, and, if he is so minded, plenty of opportunity for research of a practical kind, such as studies

on fluid and electrolyte needs in the tropics, the widespread incidence of hypoproteinaemia, and the response to chemotherapy of tropical diseases. His advice will be accepted with child-like faith and gratitude, marred only, maybe, by a large admixture of superstition, the medicine man with his bones and incantations being only just round the corner. The tropical coastal climate of West Africa makes operation wounds go soggy if ordinary dressings are applied. We found the best thing was the old-fashioned cracker dressing, and the patient either lay naked or was covered by a sheet only.

An excellent description of life and medical service in West Africa is to be found in the writings of Albert Schweitzer.

Colonial Medical Schools

So far as British Colonies are concerned, serious attempts to raise medical standards have been made, and the new medical schools, together with their new hospitals, at Makerere and Ibadan are experiments worthy of success. It is terribly important, however, to keep these environmental features to the fore, and to realize that for some years ahead it will be the public-health side of medical work and a greater number of doctors that are most needed. The vast majority of those trained in these schools are destined to practise "up country," and there surgery must be simple and curative. For some time now the Government, through the Ministry of Health, has been trying to persuade senior registrars to work for a year or more in one or other of these two places, and I would commend it for serious consideration. I realize that the difficulty so far has been that men at this stage of their career dare not risk being out of the swim of things at home. Yet so important is it to help these countries that somehow it must be planned that volunteers for such work would receive some credit for it, and a combined second year in some major centre in America or elsewhere has been suggested as an assurance to a man willing to take the risk; but, of course, this is not very easy to arrange, and for the family man it is difficult to carry out.

One does not have to stay in backward countries to see patterns very different from our own. On four occasions Russians have visited Birmingham, and we were all greatly impressed by Dr. Kupriyanov and his ingenious pieces of apparatus for bowel and vascular work. However, Russia is very short of doctors—so much so that the medical schools have been taken away from the universities and put under the Ministry of Health with the object of manufacturing as many doctors as possible. Whilst one of the Russians was watching me operate I pointed out the complete flaccid state of the diaphragm under the influence of relaxants, and afterwards asked him if they used relaxants in Russia. He replied that they had not enough doctors in Russia to allow specialist anaesthetists and that they used spinal and local analgesics extensively. Such a state of affairs must modify one's outlook on modern surgery very greatly.

Conclusions

I have wandered somewhat, yet I feel that all these ramblings carry a message. Keen students and housemen tend to think that what they see in their own teaching hospitals is the complete and last word in everything, practised in the only possible way: they will find that this is not so. Surgical trainees may imagine that they will always have exactly the same facilities as during their training: they may easily have to work with much less. Those who go abroad to work must be prepared to find quite fundamental differences in disease, in equipment, in public services, and in the general outlook of the people, and they must train themselves to be a jack-of-all-trades. Something must be done to provide adequately trained and skilled staff for the new Colonial medical schools. In our schools at home I believe that the teaching of anaesthetics needs

replanning. Finally, I believe the time has come when senior registrars should be able to spend, as part of their training, a year or more in research without loss of salary or status, and then to return to clinical work without loss of seniority.

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GENERAL PRACTITIONER RESPONSIBILITY IN GYNAECOLOGY*

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In February, 1956, we began a twelve-month field study of gynaecology in a general practice in Northumberland. We report here the results of our investigation, which was designed to enable us to do three things: (1) find out how many patients in the course of one year sought advice because of gynaecological symptoms or signs; (2) record the relative frequency of the various gynaecological conditions; and (3) study together the management of these cases, with particular reference to the part to be played by the general practitioner.

Material and Methods

The practice, situated 25 miles north of Newcastle upon Tyne on the edge of the Northumberland coal-field, is centred on a community engaged for the most part in mining, farming, and fishing; some 300 patients are women and children of R.A.F. personnel. There are three partners in the practice, and a full-time secretary is employed. Of 7,300 patients, 3,000 are females over the age of 12 years.

For the purpose of the investigation the three partners kept a separate record of all gynaecological consultations. Their notes, together with any hospital records, were produced for discussion at regular monthly meetings which all four of us attended. By agreement with the other consultant gynaecologists on the staff of the Royal Victoria Infirmary, all patients referred from the practice for a gynaecological opinion were seen by one of us (J. K. R.). In this way we were able to build up month by month a complete picture of the numbers and types of gynaecological conditions occurring among patients in the practice.

As a result of these monthly meetings, at which all the facts of each case were brought forward for consideration, we were able to discuss and formulate our views on the sphere of responsibility of the general practitioner in the management of most of the commoner gynaecological conditions.

During the twelve-months period covered by the investigation 178 women presented with gynaecological symptoms or signs (Table I).

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